DOCUMENT RESUME

ED 158 912 RC 010 654

AUTHOR Wheelock, Gerald C.
TITLE Changing Community Structure and Income Distribution: A Structural Equation Model.
PUB DATE 30 Aug 78
NOTE 23p.; Page 10 may not reproduce well due to small print size; Paper presented at the Annual Meeting of the Rural Sociological Society (San Francisco, California, August 30-September 3, 1978)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Academic Achievement; Blacks; Caucasians; *Community Development; *Economic Change; Educational Planning; *Family Income; *Labor Force; Males; Managerial Occupations; Manufacturing; Migration Patterns; *Models; *Racial Differences; Rural Areas; Rural Urban Differences
IDENTIFIERS Alabama

ABSTRACT

A preliminary model of community economic development processes, consisting of a system of simultaneous equations, is used to describe how these processes influence changes in median family income and income inequality. The analysis was performed on 61 racially mixed counties in Alabama, using 1960-70 census data. Social and demographic variables used were a Gini Index of Income Inequality in 1960 and changes in labor-force participation, manufacturing, managers, and in white and black shares of male employment. Other variables were measures of 1960-70 income distribution, 1960 median family income, proportion of black male labor force in 1960, professionals, high school education, and female-headed families. The model suggested that in urban communities, income distribution patterns are favorably influenced by division of labor at professional and managerial levels, while in low income communities, manufacturing is the path to increased median incomes. Increase in labor force participation was the key to average increase in median income and reduced income inequality in middle and lower-middle class communities. Racial disparities were evident in all cases, but in all communities, increases in education led to increased incomes and indirectly to reduced income inequality. This indicates that strategies for rural community development should be related to schools and education. (RS)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Gerald C. Wheelock

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

- ED158912

CHANGING COMMUNITY STRUCTURE

and

INCOME DISTRIBUTION: A STRUCTURAL EQUATION MODEL

by

Gerald C. Wheelock
Professor of Rural Sociology
Department of Agribusiness Education
Alabama A & M University
Normal, Alabama 35762

SEP 1978
ERIC/CRESS
RECEIVED

INTRODUCTION

A preliminary structural equation model of community economic development processes and how they influence changes in median family income and income inequality is presented. The analysis is performed on 61 racially mixed counties of Alabama using 1960 and 1970 census data. The model suggests that different processes lead to favorable changes in income distribution in different types of communities.

In urban communities, income distribution patterns are favorably influenced through the division of labor at professional and managerial levels. In low income communities manufacturing is the typical path to increased median incomes. Middle and lower-middle class communities keep pace with the average increase in median income and reduce income

---

*A paper prepared for presentation at the Annual Meeting of the Rural Sociological Society in San Francisco Hilton, San Francisco, California, August 30 - September 3, 1978.

RC010654

inequality by working at more jobs per family. Racial disparities are evident in all cases. However, regardless of community type, increases in education lead to increases in incomes and indirectly to declines in income inequality. Strategies and action programs relating education and schools to rural community development programs are indicated.

The first section of the report discusses the theoretical model explaining changes in income and income inequality. Second an empirical test of the model is presented.

THEORETICAL MODEL

The objective of this paper is to construct a preliminary model of the change process for median income and income inequality. Here, census data for 1960 and 1970 have been used to construct a model of income and income inequality for 61 racially mixed counties in Alabama. The model relates basic economic development processes as mediated by changes in the racial composition of the labor force to the rates of change in the income indicators. In the following sections, the construction and analysis of this model will be described.

Income Distribution Indicators

The overall performance of a state's economy is commonly evaluated in terms of increases in the median family income. It is possible that median family income would increase due to the increase in income of only those families at the median or above while family income below the median fails to increase. This set of circumstances would result in greater income inequality within an economy. Therefore, in addition to median income, an indicator of income inequality should be monitored. A Gini Index of Income Inequality is commonly used for this purpose (Morgan, 1962; U.S. Census, 1967). Also income figures are normally adjusted for increases in the cost of living to yield a measure of "real income." These data have the disadvantage of not being collected routinely at local county levels. Therefore, in this study it is assumed that inflation, and decline in the value of the dollar, is

constant from county to county.

For the purpose of examining the development process, the rate of change in median income between 1960 and 1970 (ΔMI) is calculated. The average 10-year rate of increase in median family income for Alabama counties was 106.3 percent compared with 81.9 percent increase for the U.S. Of course the 1960 median income (MI60) in Alabama started at a much lower base of $3,937 compared with the U.S. base of $5,421 in 1960.

Also in this study, the Gini Index of Income Inequality was computed for all counties in 1960 and 1970 and the rate of change was calculated (ΔII). For Alabama counties, on the average, ΔII declined 9.5 percent.

The standard deviations among Alabama counties for ΔII and ΔMI, were 4.52 and 26.44 percent respectively. This suggest that there is considerable variation in the success of implementing the development process across Alabama. The model is designed to estimate the relative effects of the hypothesized causes of this variation.

Indicators of Economic Activity

Increasing median income and declining income inequality will, according to theory (Kuznets, 1955; Lewis, 1955), occur simultaneously as an economy develops. Low-income economies are typified by concentrations of income in the hands of a few. Once incomes have concentrated sufficiently, the few will seek out new investment opportunities to capitalize on the availability of relatively low-cost labor. Thus, manufacturing activity usually increases. The rate of change in the percent of the labor force employed in manufacturing between 1960 and 1970 (ΔMF) is expected to increase most rapidly where MI60 was low

and II60 was high. In turn ΔMNF is expected to have a positive effect on ΔMI and indirectly lead to a decline in ΔII. There is also the possibility that certain types of low-wage manufacturing lead to exploitation of an underemployed black labor force and thus, indirectly, to an increase in income inequality (See Wilcox, 1977, for a summary of theories of exploitation).

Development in the administrative, business and financial sector is not dependent upon a low-wage labor force. It is more likely that such economic activity thrives on higher wages. Higher income communities attract more professionals (centers of government, federal institutions, universities, etc). In turn, more professionalization typically leads to increased specialization and division of labor and the employment of more managerial skills. Administrative and business activity, typically the domain of white males as opposed to women or blacks, may then be expected to lead to the employment of more whites males (Daymont, 1977). Only to the extent that black capitalism and political influence has taken root would this structural effect be expected to decline (Wilcox, 1977). In turn, more employment due to manufacturing or specialization of services would lead to increased median income, ΔMI. To make the circle complete, higher incomes should lead to more business investment and more managers. As in the case of manufacturing, development of the administrative and business sectors, is expected to lead to increasing incomes, ΔMI, and to a decline in income inequality, ΔII.

While manufacturing employment is expected to grow most rapdily in the low-income communities and managerial employment most rapidly in the professional and urban communities, labor force participation is more likely to increase in middle or lower-middle class communities.

These communities have larger proportions of working women and families with two or more jobs. While they have to work more hours per family, communities which increase their participation in the labor force are likely to reduce income inequality (Sale, 1972). Labor force participation may also be increasing more rapidly in predominantly white communities. Historically, black families have had a greater proportion of multiple earners than white families. In recent years this proportion has been declining (Census, 1974).

Tracing the expected influence of community racial composition is perhaps the most complex mechanism in the analysis of the change of income distribution during the 1960s. Females regardless of race still tended to be employed in lower or lower-middle income positions. Thus the biggest differences should be observed between employment status of black and white males. If we observe only the difference between the proportions of employed males which are white in 1960 and 1970, except for a reversal of signs (+ to - or visa versa), it is exactly the same as for the employed males which are black. Such an absolute difference score does not reflect the change in black or white male employment relative to its original proportion. However, when the difference scores with their respective signs (+ or -) are divided by the proportions for both races respectively, two variables are derived: one reflects the relative change in the black share of male employment (ΔMBE) and the other mirrors change in the white share of male employment (ΔMWE). The magnitude of these variables is largely due to a uniformly rapid out-migration of black males from the rural South. A second determinant is the more variable but significant in-migration of technically-skilled white males. Communities with a proportionately

large black-male labor force in 1960 would be expected to show an increase in the white-male share (ΔMWE) even though the total labor force may have declined. In turn, ΔMBE would be expected to have a positive regression effect upon ΔII, i.e., as MBE decreases, II also decreases. In the tradition of low-average wages for black males, it is also expected that ΔMBE would be negatively associated with ΔMI. Thus both the direct effect and the indirect effect of ΔMBE upon ΔII would be positive.

It should be acknowledged in the model that any variation in the changing proportions of households headed by females would have a direct positive effect upon income inequality computations based on family income (Wheelock, 1974).

Finally, past investments of the community in providing a high school education for its population should have a positive impact upon median income (ΔMI) and thus indirectly contribute to a decline in income inequality (ΔII). Perhaps the variable which comes closest to being manipulated by policy is the percent with a high school education. Even when sex, age, and race differences are taken into account, the effect of education upon increasing income holds (Glick and Miller, 1956; Miller, 1966; Aigner and Heins, 1967).

THE SIMULTANEOUS EQUATION MODEL

The model used to describe the complex interrelationships that obtain between components of the changing economy and the income distribution process consists of a system of simultaneous equations. Such a set of equations can be used to determine the response of income

indicators to changes in components of the changing economy such as increases in education, manufacturing or business activity.

Data on 61 Alabama counties with a black population of 400 or more in 1970 from the U. S. Bureau of the Census (1961 and 1971) have been used to estimate the parameters of this model.

Endogenous Variables

The model accounts for variations in a set of endogenous variables that characterize economic development and income distribution processes. The social and demographic variables used to model the economic development process are a Gini Index of Income Inequality in 1960 (II60); change in labor-force participation (ΔPLF) measured by the 10-year aggregate rate of change in the percent of all persons 16 years and older, who are in the labor force; manufacturing (ΔMNF) measured as the rate of change in the percent of all employed in industry, who are in manufacturing; managers (ΔMNG) measured by the rate of change in the percent of all reporting occupations, whose reported occupation falls into the census category of managers and administrators except farm; and finally, the white share of male employment (ΔMWE) and the black share of male employment (ΔMBE) as described above.

The income distribution variables are the percent change in median income, 1960 to 1970 (ΔMI) and the percentage change in the Gini Index of Income Inequality, 1960 to 1970 (ΔII).

Predetermined variables consist of exogenous variables. They include the median family income of 1960 (MI60); the proportion of the male labor force which was black in 1960 (BM60); professionals (ΔPR) measured by the rate of change in the proportion of the labor force composed of professionals; high school education (ΔHSE) measured as the rate of change in the proportion of the population 25 years or over who have completed 12 or more years of education; and female headed families indexed by the rate of change in the proportion of families headed by a single parent (ΔOPF). Table 1 shows the interrelations among the two sets of variables.

The structural model is graphically represented in Figure 1.

Identification of the Model

This model is identified as described by Anderson (1973, 289).

> Before estimating the parameters of the structural equations, it is necessary to determine whether or not a sufficient number of constraints have been imposed on the set of equations so that the parameters can be identified. Otherwise there will be an infinite number of sets of parameter values that are compatible with both the data and the restrictions, and the structure of the model cannot be determined (Christ, 1966). In the type of model presented here, where the only constraints imposed are that certain variables do not appear in certain equations used to predict values of the endogenous variables, Fisher (1966) provides a means of determining whether or not each equation is identified. An equation is identified if a number of variables equal to one less than the total number of equations is excluded from that equation.

Table 1: Means, Standard Deviations, and Pearsonian r Correlation Matrix for Rates of Change in Labor Force Structure and Income Distribution (61 Alabama counties)*

Δ1960 - 1970	MI60	YI60	IM60	ΔMF	ΔOFF	ΔMSE	ΔFLF	ΔTP	ΔMG	ΔWE	ΔBE	ΔMI	ΔII
County Mean	3.085	0.443	28.8	14.1	24.6	45.7	2.17	2.58	16.0	9.95	-17.1	106.	-9.49
Standard Deviation	.971	.046	19.2	26.2	14.6	12.8	9.33	16.07	35.1	14.12	10.3	26.4	4.51
Median Income 1960[1]	1.00	-.80	-.59	-.64	.05	-.36	.22	.58	-.35	-.54	-.04	-.83	.15
Income Inequality 1960[2]		1.00	.75	.58	-.19	.07	-.31	-.52	.33	.72	-.14	.77	-.35
% Male Employed Black 1960[3]			1.00	.45	-.26	-.09	-.48	-.51	.29	.78	-.03	.49	-.03
Δ Manufacturing Employment[4]				1.00	.07	.04	-.11	-.62	.25	.30	.35	.48	-.07
Δ One Parent Families[5]					1.00	.06	.21	-.08	.09	-.29	.31	-.07	.32
Δ High School Education[6]						1.00	.27	.12	.24	.10	-.11	0.39	-.15
Δ Partic. in Labor Force[7]							1.00	.43	-.42	-.42	.06	-.04	-.19
Δ Total Population[8]								1.00	-.17	-.35	-.32	-.24	-.22
Δ Managers in Labor Force[9]									1.00	.42	.17	.47	-.14
Δ Male White Employment[10]										1.00	-.29	.55	-.14
Δ Male Black Employment[11]											1.00	-.20	.35
Δ Median Income[12]												1.00	-.42
Δ Income Inequality[13]													1.00

[1]Median family income, Census of Population 1960 ($000)

[2]Gini Index of Income Inequality based on 1960 income distribution

[3]Percent of Male Employment which is black 1960

[4]Change in the percentages of the total employed labor force engaged in manufacturing 1960-1970

[5]Change in the percent of families with one parent 1960-70

[6]Percent change in the proportion of the population 25 and over with a high school education, 1960-70.

[7]Percent change in the proportion 16 and over in the labor force, 1960-70.

[8]Percentage change in the total population, 1960-70

[9]Percent change in the proportion of the labor force designated as managerial level, 1960-70.

[10]Change in the percent of male employment which is white, 1960-70

[11]Change in the percent of male employment which is black, 1960-70

[12]Percent change in median family income, 1960-70.

[13]Percent change in the Gini Index of family income inequality, 1960-70.

* Six (6) Alabama counties had fewer than 400 black population in 1960 and 1970 and are not included in the analysis.

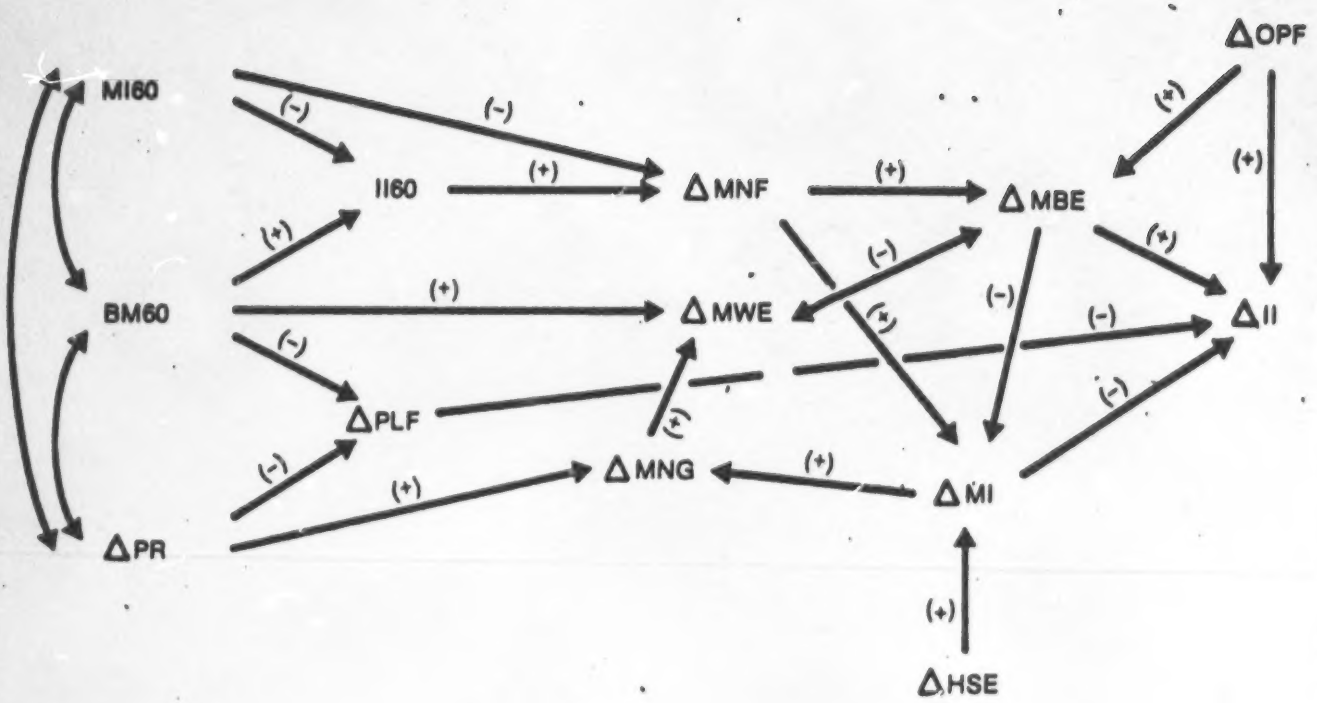

FIGURE 1. STRUCTURAL EQUATION MODEL OF THE CHANGE PROCESS FOR INCOME AND INCOME INEQUALITY

In the present model an equation is identified if seven variables are excluded from the equation. Inspection of equations (1) through (8) that appear in the section on structural equations indicates that all of these equations are identified.

Estimation and Interpretation of Model Parameters

A two-stage least square technique has been used to estimate parameters of the model since ordinary least squares would provide parameter estimates that are both biased and inconsistent (Johnston, 1963; Goldberger, 1964). In the first stage of this method, each endogenous variable is regressed on all of the predetermined variables using ordinary least squares. In the first-stage, an additional predetermined variable was used to estimate the endogenous variables included in the model. This variable was the 10-year rate of change in the total population. Fisher (1971) and Heins (1975) discuss the merits of this approach and Anderson (1973) illustrates it use. Next observed values of the predetermined variables are substituted into these equations in order to estimate the values of the endogenous variables. In the second stage, the parameters of the original set of structural equations are estimated by ordinary least squares using the predicted values of the endogenous variables and observed values of the predetermined variables as independent variables. Coefficients estimated by this two stage procedure are still biased but are consistent and more efficient than the values that would have been

obtained using the ordinary least squares technique (Johnston, 1963; Goldberger, 1964). Three of the predetermined variables and all seven of the endogenous variables (Figure 1) are measures of change for 10-year intervals expressed in percentages. Therefore, these parameter estimates may be interpreted as partial elasticities, e.g., for every percent change in X, Y changes β xy.z percent. These parameters have the advantage of being unit free. However, unlike the elasticities derived for the log-log model used frequently in economics (Coleman, 1968; Hanushek and Jackson, 1977: 79, 98), the partial elasticities presented here are by nature of their computation constant for all values of the variables involved. Parameter estimates for the structural equations obtained by using this method are presented in the next section.

The Structural Equations

An equation is written for each endogenous variable included in the model. The coefficient indicates the direct effect that an independent variable has on a dependent endogenous variable with the effect of all other variables appearing in that equation controlled (Suits, 1962). For example, income inequality in 1960 is considered to be affected by both median family income and racial composition of the labor force in 1960. The equation then is:

$$\text{(1)} \quad \underset{}{\text{II60}} = .494 - \underset{(-6.98)}{.026}\ \text{MI60} + \underset{(5.36)}{.001}\ \text{BM60}$$

$$\bar{R}^2 = .75$$

The numbers shown in parentheses are t-values for the regression coefficients. They indicate the multiple by which the regression coefficient exceeds the standard error. The squared multiple correlation coefficient is shown below the equation. It is adjusted for degrees of freedom and represents the proportion of the variance in the dependent variable explained by the model. The $\bar{R}^2$ presented here for two stage least squares equations is analogous to the $\bar{R}^2$ for ordinary least squares (Hanushek and Jackson, 1977:269).

The sign of the coefficient for median income is negative as expected. In addition, the sign for the proportion of the male labor force which is black is strongly positive. This reflects the disproportionately low wages paid to blacks in agriculture and manufacturing in 1960 (Sale, 1972; U. S. Bureau of the Census, 1967).

The second structural equation tests the hypothesis that manufacturers seek out low-income labor forces or communities with high income inequality (a few wealthy entrepreneurs and a large low-income labor force). The positive sign of the coefficient for income inequality and the negative sign for median income support the hypothesis.

$$\Delta MNF = -17.54 + 152.6\ II60 - 11.61\ MI60 \qquad (2)$$
$$(1.00) \qquad (-6.37)$$
$$\bar{R}^2 = .40$$

As indicated by the t-values the standard error for II60 is more than half as large as the regression coefficient. This is to be expected as income inequality and median income are highly, but negatively correlated (-.80, Table 1). In spite of this evidence of multicollinearity, the signs are as expected and the fit is reasonable with an adjusted $\bar{R}^2$ of .40.

Increases in labor force participation, usually in the form of working women and families with two or more jobs, are expected outside the highly professionalized communities and the predominately black economies. Both coefficients are negative and more than twice their standard errors. The hypotheses are supported:

$$(3) \quad \Delta PLF = 11.47 - .136\ BM60 - .153\ \Delta PR \qquad \bar{R}^2 = .51$$
$$(-2.91) \quad (-6.00)$$

The increase in management and administrative occupations is a function of a more specialized division of labor which follows professionalization of business and government services. Also specialization of the management function is enhanced when the median income of the community can support and demand more specialized professional services. As hypothesized both signs are positive and the coefficients are more than twice the size of their standard errors.

$$(4) \quad \Delta MNG = -44.1 + .42\ \Delta MI + .44\ \Delta PR \qquad \bar{R}^2 = .38$$
$$(2.69) \quad (4.24)$$

Increases in the white share of male employment is largely a function of the out-migration of black males from the rural South during the 1960s. At the same time, agencies, institutions, and businesses have attracted managerial skills, primarily white males, from other regions. The coefficients for both of these variables are positive (+) in sign as hypothesized. As a means of defining the joint conditional probabilities distributions of ΔMBE and ΔMWE, the former is also included in the equation (Strotz and Wold, 1971). As expected ΔMBE has a negative coefficient, -.376. The equation (5) accounts for 6 percent of the variation in the change in the white share of male employment.

Increases in the proportion of male employment which is black is certain to be negatively related to the corresponding white ratio. The simple linear correlation will be less than perfect except for the case in which each county started with an equal 50 percent black and white male employment ratio. The black male employment ratio is also likely to increase with the increase in manufacturing employment as long as there is a surplus of low-wage black male labor.

$$(5)\quad \Delta MWE = -13.02 + .11\ \Delta MNC - .376\ \Delta MBE + .51\ BM60$$
$$(1.89)\quad (-1.87)\quad (8.36)$$
$$\bar{R}^2 = .68$$

$$(6)\quad \Delta MBE = -20.2 - .28\ \Delta MWE + .22\ \Delta MNF + .11\ \Delta OPF$$
$$(-2.10)\quad (2.93)\quad (1.28)$$
$$\bar{R}^2 = .28$$

Finally, it may be expected that a welfare system which makes it more rewarding economically for low-income families to maintain separate residences for the women and children on the one hand and for the men on the other will lead to a positive relationship between the increase in the proportion of one parent families and the proportion of low-paid males (in this case black males) in the labor force.

The signs for the coefficients of these three variables (6) are all as hypothesized but the standard errors are relatively large, particularly for the one parent family variable. It is likely that some non-linear fit of the ΔMWE variable would increase the $\bar{R}^2$ from its relatively low 28 percent.

Contributions to the increase of median family income are expected from increases in education and manufacturing while a negative sign is expected for the black male employment share variable. These hypotheses

are supported. However, the $\bar{R}^2$ is only .003. It should be observed that the coefficients for ΔMNF and ΔMBE are extraordinarily large and in opposite directions. This is a sign of multicollinearity, at least in this 2SLS solution.

$$(7)\quad \Delta MI = 24.20 + \underset{(5.67)}{1.17}\ \Delta MNF - \underset{(-3.43)}{2.57}\ \Delta MBE + \underset{(1.72)}{.476}\ \Delta HSE$$

$$\bar{R}^2 = .003$$

An alternative equation (7a) includes MI60 as an explanatory variable in the place of ΔMNF. In effect inclusion of MI60 represents a control for the starting point in measuring the dependent variable, ΔMI. For each additional one thousand dollars median income in 1960, a county's ΔMI increased at a rate equal to 22.63 percentage points slower. Typically, counties with high median incomes will increase at slower ratio than counties starting with low median incomes. This is true even though the actual dollar gap may be widening. The interesting observation in this rigorously controlled equation is

$$(7a)\quad \Delta MI = 154.91 - \underset{(-2.89)}{1.04}\ \Delta MBE + \underset{(0.47)}{.076}\ \Delta HSE - \underset{(-10.78)}{22.63}\ MI60$$

$$\bar{R}^2 = .70$$

that the coefficients for ΔMBE is still a negative 1.04 and ΔHSE is a positive .076. A significant factor leading to increasing median family incomes has been the relative decline of male black employment. Less significant but nevertheless positive is the effect of an increasing proportion of high school educated adults upon median family income.

It should be observed that in both (7) and (7a) increases in management and white male employment shares are acting indirectly through decreases in black male employment shares to cause an increase in median income. Note that the product of the signs on the path from managers to median income is positive (Figure 1).

The major contributor to the decline in income inequality is expected to be an increase in median income followed by increases in labor force participation rates. Indeed both of these coefficients do have negative signs and their coefficients are larger than twice their standard errors. The labor force participation variable is relatively stronger than expected suggesting that in the middle and lower-middle class communities more and more families are trying to keep up with the average increase in median family income by holding several jobs.

$$\begin{array}{lll} (8) \quad \Delta II = -3.54 + .15\ \Delta MBE - .158\ \Delta PLF - .047\ \Delta MI \\ & \quad (1.32) \quad (-2.27) \quad (-2.20) \\ & + .08\ \Delta OPF \\ & \quad (1.90) \end{array}$$

$$\bar{R}^2 = .30$$

As expected, change in the proportion of one parent families has a positive regression effect upon change in income inequality. Also the sign for change in the male black employment share is positive. But, considering its +.33 zero order correlation with change in income inequality, the direct effect is much smaller than would be expected. The several positive indirect effects in the model, e.g., via ΔMI, or ΔOPF, apparently account for this unexpected finding.

CONCLUSIONS

This model is of very little help in suggesting how greater gains in median family income or greater declines in income inequality can be brought about. This is because most of the variables are not directly manipulable by policy. As a tool to monitor our progress toward these goals, however, the model is useful. For example, as the black and white male labor force becomes more integrated, the significant direct effects of these variables upon change in median income (Equation 7) will fade. This will leave a negative direct effect from ΔMNG to ΔII in place of the current negative indirect effect via ΔMWE and ΔMBE. (In Figure 1 note that the product of the signs linking these variable is negative). Similarly, with a fading of the effects of racial labor force share variables, ΔMNG will be left with a positive direct feedback effect upon ΔMI instead of the current positive indirect effect via ΔMWE. With continued progress in integration this model posits a central role for managers. Similarly, other structural changes can be observed.

Also, further refinement of this model will be useful. Computation of the reduced form equations, for example, will allow the expression of each endogenous variable as functions of the predetermined variables included in the model. The coefficients can be interpreted as measuring the combined direct and indirect effect of each predetermined variable on the endogenous variable allowing for adjustments in other endogenous variables (Anderson, 1973; Suits, 1962).

With the 1980 Census at hand and a wealth of comparable data for all states, a two decade study of economic and social development

following the civil rights movement is needed, both to refine our models of what has been achieved and to chart our progress objectively.

REFERENCES

Aigner, D. J. and A. J. Heins. 1967. On the determinants of income inequality. American Economic Review 57: 175-184.

Anderson, James G. 1973. Causal models and social indicators: Toward the development of social systems models. American Sociological Review 38: 285-301.

Christ, C. F. 1966. Economic models and methods. New York: John Wiley.

Coleman, James S. 1968. "The mathematical study of change." in Methodology on social research, Herbert M. Blalock, Jr., and Ann B. Blalock, editors, McGraw-Hill, New York.

Daymont, Thomas N. 1977. Black-white differences in labor market allocation processes in the late 1960's. Center for Demography and Ecology, University of Wisconsin, Madison, CDE Working Paper 77-21.

Fisher, F. M. 1966. The identification problem in econometrics. New York: McGraw-Hill.

Fisher, Franklin M. 1971. "The Choice of Instrumental Variables in the Estimation of Economy-Wide Econometric Models" in causal models in the social science, Herbert M. Blalock, Jr., Editor, Aldine, Chicago.

Glick, Paul C. and Herman C. Miller. 1956. "Educational level and potential income." American Sociological Review 21: 307-12.

Goldberger, Arthur S. 1964. Econometric theory. New York: John Wiley..

Hanushek, Eric A. and John E. Jackson. 1977. Statistical methods for social scientists, Academic Press, New York.

Heise, David B. 1975. Causal analysis. Wiley, New York.

Johnston, J. 1963. Econometric methods. New York: McGraw-Hill.

Kuznets, Simon. 1955. Economic growth and income inequality. American Economic Review 45: 1-28.

Lewis, W. A. 1955. The theory of economic growth. Illinois: Richard D. Irwin.

Miller, Herman C. 1966. Income and distribution in the United States. Washington, D. C.: U. S. Bureau of the Census.

Morgan, James. 1962. The review and anatomy of income distribution. The Review of Economics and Statistics, August, p. 281.

Sale, Tom S. 1972. A socio-economic approach to income distribution: The case of Louisiana, 1950-1970. Paper presented to the annual meeting of the Southern Demographic Group, September 29, 1972. Oak Ridge, Tennessee. Department of Economic, Louisiana Tech. University, Ruston, La.

Strotz, Robert H. and H. O. Wold. 1971. "Recursive versus non-recursive systems: An attempt at synthesis." in Causal Models in the Social Sciences, Herbert M. Blalock, Jr., Editor, Aldine, Chicago.

Suits, D. B. 1962. Forecasting and analysis with an econometric model. American Economic Review 52: 104-32.

Wheelock, Gerald C. 1974. Structural and demographic determinants of family income and income inequality in north Alabama. Art Cosby, editor. Rural Sociology in the South: 1974. Texas A & M University, College Station.

Wheelock, Gerald C. 1975. Labor force configuration and income inequality in a rapid - growth region. H. Max Miller, editor. Rural Sociology Section of the South: 1975. University of Georgia, Athens, Georgia.

Wilcox, Jerry and Wade Clark Roof. 1977. Percent black and black-white status differentiation. Paper prepared for presentation at the 72nd annual meeting of the American Sociological Association, September 5-9, 1977 in Chicago.

U. S. Bureau of the Census. 1974. The social and economic status of the black population in the United States. 1973. Current Population Report, Special Studies Series P-23, No. 48. U.S. Government Printing Office, Washington, D. C.

U. S. Bureau of the Census. 1967. Trends in the income of families and reasons in the United States: 1947-64. Technical paper No. 17, U. S. Government Printing Office, Washington, D. C.